JOURNAL OF CHEMICAL EDUCATION

Book and Media Review

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Review of *ChemConnections Activity Workbook*

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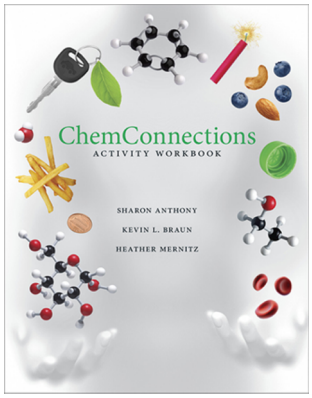
ChemConnections Activity Workbook, by Sharon Anthony, Kevin L. Braun, and Heather Mernitz. W. W. Norton & Company, Inc.: New York, 2012. 352 pp. ISBN: 978-0-393-91305-7 (paperback). $26.25.

The *ChemConnections Activity Workbook* is an excellent resource for chemistry teachers at both the high school and college level. Most of the activities within the book are themed worksheets that cover a broad range of chemistry topics, with an emphasis on general chemistry, organic chemistry, and environmental chemistry. While the different activities in the workbook were adapted from much longer *ChemConnections* modules,[1] each activity is an independent worksheet that can be used for group problem solving or as a homework assignment. These activity worksheets can supplement any chemistry curriculum or textbook. Apart from the worksheets, the *ChemConnections Activity Workbook* also includes 10 laboratory activities.



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One of the better attributes of this book is that each worksheet centers around a particular theme, thereby promoting student interest. For example, in Activity 5 students practice writing formulas and naming compounds that are used in fireworks. This activity worksheet includes straightforward descriptions of the chemical reactions associated with fireworks and the color or function of each compound is noted in parentheses (15−17). Each worksheet is prefaced by a set of learning goals. The list of learning goals is followed by a short, engaging introduction that connects a specific chemistry skill to a broader, more student-relevant theme. The authors challenge students to "note the relevance of each answer to your daily life" (p 31) in the introduction to an activity worksheet with stoichiometry problems focused on greenhouse gas emissions. The problem-solving questions become progressively harder as students work through the activity worksheet. The end result is an extensive collection of interesting and rigorous activity worksheets.

Even though the *ChemConnections Activity Workbook* serves as a useful resource for teachers, it would be difficult to adopt the book in its entirety as a supplemental text to a single chemistry course. The book includes 49 worksheet activities and 10 laboratory activities. At best, approximately half of these activities would be suitable for use in a first-semester, college-level general chemistry course. The remaining activities address a diverse set of topics, including functional groups, solubility, the Carnot cycle, electrical resistance, biomolecule classification, and spectroscopy. Given the diversity of topics, the authors have included three different tables of contents. The first table is arranged by page number, the second table is organized by topic, and the third table is organized by theme. While these additional tables of contents are helpful, it would be very useful if the activities were published, or made available electronically, as smaller workbooks based on traditional chemistry course content. It is also important to note that, while the activity worksheets provide students with captivating supplemental practice problems, students will still need to reference their chemistry textbook and lecture notes for guided examples and background information. Finally, it might be difficult to use some of the activities in an introductory chemistry course because of the use of line notation. For example, in Activity 19, students use bond energies to calculate the enthalpy of combustion for various fuels (73−76). This particular worksheet would work well with the thermochemistry chapter in a general chemistry course, but the depiction of glucose using line notation (75) might confuse and intimidate students at this level.

The 10 laboratory activities that are included in the *ChemConnections Activity Workbook* range from basic to advanced. In Activity 4, students make basic observations on the properties of different plastics and work to develop a separation scheme based on polymer density (13−14). Activity 48 is a five-part biodiesel synthesis laboratory that culminates in a combustion test, analysis of the product via infrared spectroscopy, and a formal written lab report (237−244). Use of the *ChemConnections Activity Workbook* as a laboratory book for a single chemistry course would be impractical, given the broad range of topics and skill levels encountered in the laboratory activities. However, teachers with limited resources will appreciate that many of the activity worksheets involve analysis of provided experimental data. In Activity 12, students are asked to describe how they would prepare different phosphate standards for a calibration curve. In Part II of the same activity worksheet, students use Excel to create a calibration curve and are provided with both absorbance and concentration values. Students use this calibration curve to determine the phosphorus concentration in three different river

DOI: 10.1021/acs.jchemed.6b00219
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samples. Absorbance values for the river samples are provided (43−46). In some cases, the experimental data provided by the activity worksheet serves as an alternative to a dangerous lab. This is the case for Activity 17, in which students analyze calorimetric data from the burning of ethanol, isoocatane, and MTBE (63−68).

In conclusion, the *ChemConnections Activity Workbook* is a must-have resource for chemistry teachers. It could serve as a great reference for busy teaching assistants looking for supplemental practice problems for a recitation section, AP chemistry teachers looking for meaningful student-centered activities with limited resources, or college professors wanting to incorporate small-group work into lecture. Successful incorporation of the thematic activity worksheets into an established course would require some forethought, yet this would maximize student engagement and learning.

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Notes

The authors declare no competing financial interest.

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(1) About the Chem Connections Project. http://chemistry.beloit.edu/modules.html (accessed Mar 2016).

DOI: 10.1021/acs.jchemed.6b00219
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